2 Sheets—Sheet 1.

J. H. SAWYER.

SPINDLES FOR MULES AND JACKS.

No. 184,986. Patented Dec. 5, 1876.

Fig. 4.

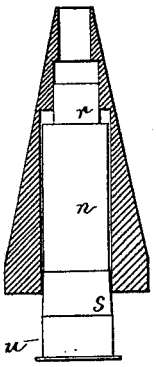
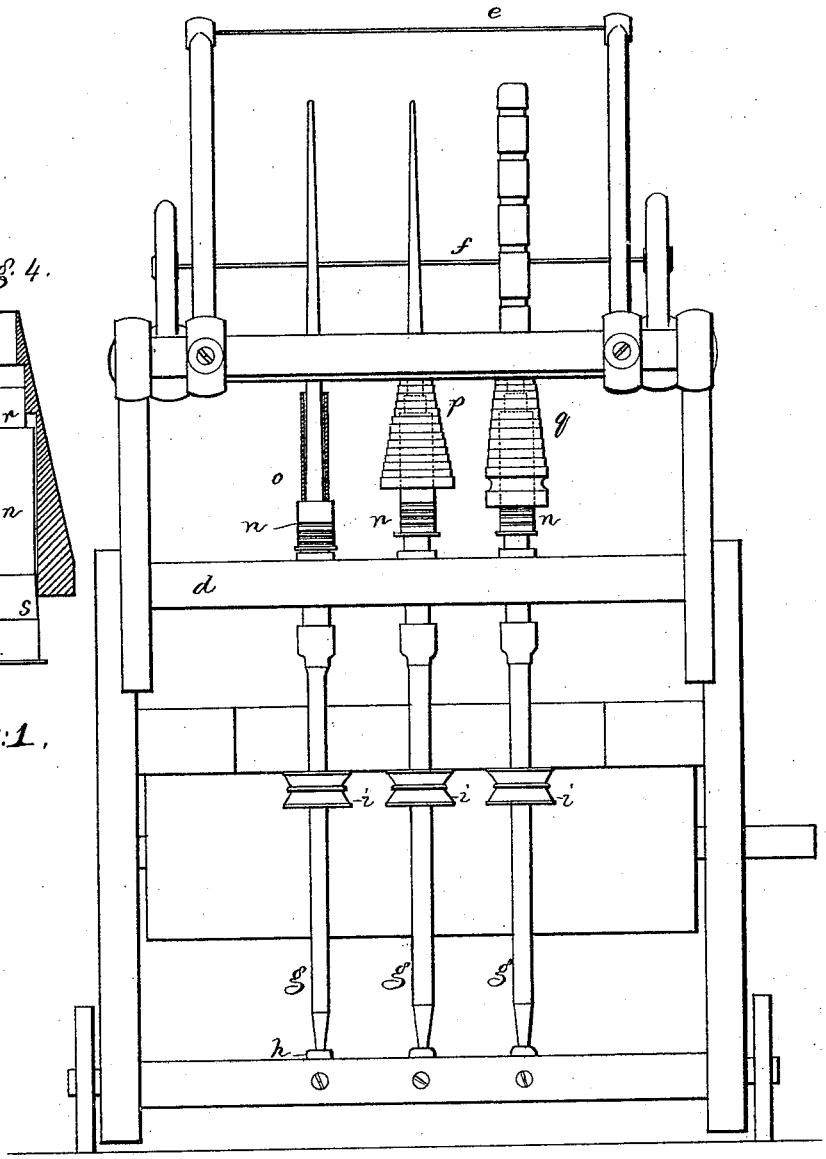


Fig. 1.



Witnesses.
L. H. Latimer.
W. J. Pratt.

Inventor.
Jacob H. Sawyer
per Crosby & Gregory.

2 Sheets—Sheet 2.

J. H. SAWYER.

SPINDLES FOR MULES AND JACKS.

No. 184,986. Patented Dec. 5, 1876.

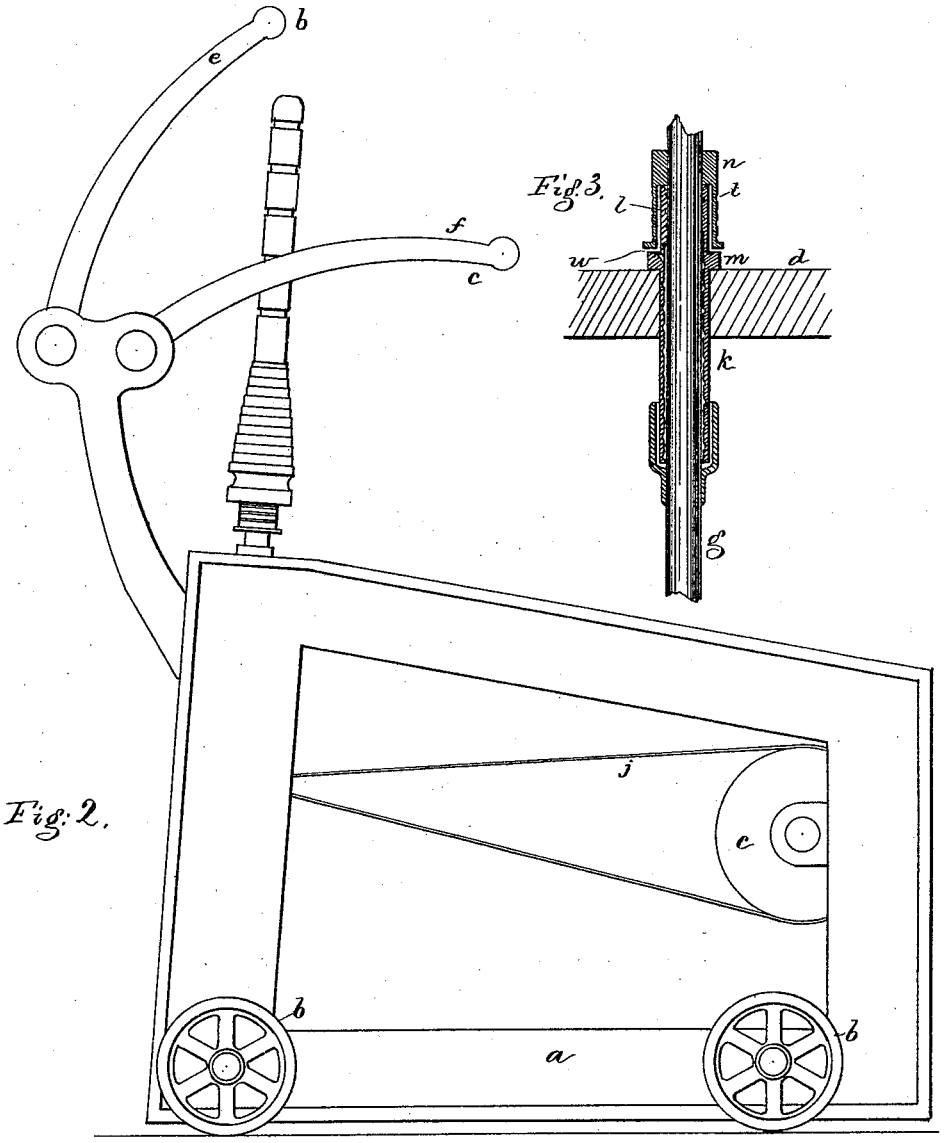


Fig. 2.

Fig. 3.

Witnesses.

L. H. Latimer.

W. J. Pratt

Inventor.

Jacob H. Sawyer

per Crosby & Gregory Atty's.

UNITED STATES PATENT OFFICE.

JACOB H. SAWYER, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN SPINDLES FOR MULES AND JACKS.

Specification forming part of Letters Patent No. **184,986**, dated December 5, 1876; application filed January 10, 1876.

To all whom it may concern:

Be it known that I, JACOB H. SAWYER, of Lowell, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Mules or Jacks for Spinning, of which the following is a specification:

This invention relates to mules or jacks for spinning. In mules and jacks, as now constructed, a portion of each spindle, for a short space above the bolster-rail, is used during the operation of doffing as a means for holding the end of the yarn, which yarn is afterward led from that point to, and is wound upon, the cop-tube, or cop-base, or bobbin; and when the cop-tube or base and spindle, or the bobbin, if one is used, has received its yarn-load, then the thread is wound again below the base of the yarn-load and onto the spindle before the cop-tube, base, or bobbin, with its yarn-load, is doffed. This operation leaves the yarn attached to the lower part of the spindle ready to be wound upon another cop-tube, base, or bobbin, or higher up upon the bare spindle. In mule or jack spinning this spindle-surface, between the yarn-load and top of the bolster-rail, is absolutely necessary to hold the yarn before doffing, and to retain the yarn ready to be subsequently wound, and this necessity has prevented the extension of the bolster above the top of the bolster-rail.

This invention consists in the combination, in a mule or jack, and with faller-wires, of a yarn receiver and holder, as hereafter described, attached to the solid spindle, and made to receive the yarn, as set forth, and cover the upper end of the bolster, whereby the spindle is provided with a bearing and steadied at a point quite up to, or within, the base of the yarn-load, thereby permitting the spindle to be revolved more rapidly without wabbling, to be made shorter and lighter, and to be run with less power.

Figure 1 is a front view of part of a mule-carriage sufficient to illustrate this invention; Fig. 2, an end view thereof; Fig. 3, a section, taken through the yarn receiver and holder and bolster, and Fig. 4 a modified construction of receiver and holder and surrounding cop-base.

In the drawing, *a* represents a mule or jack carriage, provided with wheels *b*, spindle-driving drum *c*, bolster-rail *d*, and faller *e*, and counter-faller *f*, all of any well known or suitable construction, and operated in any well known or usual way. The rotating spindles *g* are solid, are sustained in foot or end bearings *h*, and are provided with wharves *i*, to receive driving cords or bands *j*. These spindles pass through the bolsters *k* sustained in, or forming a part of, the bolster-rail, their upper ends *l* projecting above the top of the carriage, thereby elevating the bearings on the spindles with relation to the yarn-load, and the bearings operate against portions of the spindles heretofore reserved to receive and hold the ends of the yarn prior to doffing the yarn-load from the spindles. On the spindle above the bearing-top *l* of the bolster is placed a yarn receiver or holder, *n*, which consists of a collar attached to the spindle and a cylindrical extension encompassing and passing down over and around the upper end of the bolster, and so arranged as to expose, at its lower end, a revolving surface below the base of the cop, so that the yarn may be wound thereon prior to the operation of doffing, as herein described. The yarn receiver and holder *n*, when a cop-tube is used, as at *o*, will be attached to the spindle at a point on the spindle substantially where the bottom of the cop-tube or yarn-load is to terminate, and the upper end *l* of the bolster extends up into this holder, as shown in section, Fig. 3, to reduce the amount of vibration specially at the top of the spindle. In case a wood or other base, *p*, truncated, or grooved, or notched, as in Fig. 1, or made plain, as in Fig. 4, or of other well-known construction, is used, it is provided with an enlarged opening (see section in Fig. 4 and dotted lines, Fig. 1) to fit over the yarn receiver or holder, made longer than in Fig. 3, so as to place the base or lower end of the yarn-load below the upper shoulder of the yarn receiver and holder, thereby permitting the upper end of bolster *l* to be also extended upward to support the spindle at a point within, or more or less near, the center of the yarn-load, this construction enabling mule and jack spindles to be supported more efficiently and to be driven with greater speed, without increase of vibration,

at the top of the spindles, substantially as practiced in the Sawyer system of ring-spinning. The yarn receiver and holder, when adapted to extend into a base, *p*, or a bobbin, may be made either cylindrical or tapering upon its outer periphery, or it may be cylindrical for a greater or less extent, and at or near its lower end above the portion *u* (see Fig. 4) where the yarn is to be wound prior to doffing. The holder may be tapering, (see Fig. 4,) so as to cause the base or bobbin to adhere to the yarn receiver and holder, the inclination being sufficiently gradual to permit the extreme lower end of the base to be retained in proper position with relation to the movement of the faller-wire, to correctly receive the yarn and wind all the yarn-loads down to the same position. The extreme upper end of the yarn receiver and holder, when extended, as shown in Fig. 4, is shouldered or reduced to form a bearing, *r*, for the base or bobbin at the upper end of the truncated portion, this construction permitting the upper end of the yarn-holder to steady the base or bobbin at a point near its upper end.

It is, of course, obvious that the yarn wound below the regular base of the yarn-load, or below the cop-tube, or cop-base, or bobbin, must be wound upon a surface moving with the spindle, and that it cannot be wound upon a stationary projection or bolster; therefore the upper end of the bolster is guarded by the yarn receiver and holder, and the latter is, preferably, provided with annular rings or notches *t* to hold the yarn. The carriage *a* is moved by any usual means. The material to be spun into yarn or thread is supplied to the spindle from rollers on the head of the machine. The yarn, leaving the rollers, passes over the counter-faller and under the faller, and is connected with the spindle or yarn-load, and the twist extends from the rollers to the yarn-load. When the yarn-load is of sufficient size to be doffed, the faller and counter-faller are depressed, so as to wind the yarn below the base of the yarn-load and upon the yarn holder or receiver that moves with and surrounds the upper end *l* of the bolster; and, after the yarn is fastened to the holder or receiver, the yarn, wound in cop form, is doffed from the spindle, leaving the yarn extending from the rollers attached to the yarn holder or receiver, and after a new cop-tube, or base, or bobbin, if either be used, is applied to the spindles, the counter-faller, in its upward movement, lifts the yarn, and so guides it from the yarn-holder upon the cop-tube, base, or bobbin, that the spindle, in its revolution, winds the yarn upon the cop-tube, base, or bobbin, for a new yarn-load.

This invention is applicable to any well-known form of mule or jack. The interior of the bushing may be provided with grooves, to be supplied with oil through a hole, *w*, the grooves and rotating spindle keeping the oil in circulation to thoroughly lubricate the bearing-surfaces.

It is also obvious that the invention above described, and as hereinafter claimed, may be applied to the spindles of ring spinning-frames in order to facilitate the operation of doffing the full bobbins. The receiver or holder placed on the spindle of the ring spinning-frame with relation to the bolster and bobbin, as hereinbefore described, will project below the lower end of the bobbin and rotate with the spindle; and when the bobbin is supplied with its yarn-load, the ring-rail is lowered (suitable mechanism for the purpose being provided) to a position lower than any position to which the ring-rail ever descends in its regular motion when the yarn is being wound on the bobbin, and in this position the yarn is wound on the receivers just before the bobbins are doffed, in order to retain the yarn connected with a surface moving with the spindle, ready to be wound on and applied to a new or empty bobbin.

I claim—

1. The solid rotating spindle, supported by, and turning in, a footstep, *h*, and the attached yarn receiver and holder, and a bolster and bearing for the spindle, placed between the spindle and yarn-receiver, and within, and adapted to be covered by, the yarn-receiver, in combination with the fallers, to operate all substantially as described.

2. The combination, with a movable carriage, spindle, and fallers, of a yarn receiver and holder, connected with the solid rotating spindle, and extended below the base of the cop-tube, cop-base, or bobbin, and adapted to receive and hold the yarn and receive and cover the bolster, substantially as described.

3. The combination, with a solid rotating spindle and a bobbin, and a bolster extended up within the base of the bobbin, of a yarn receiver or holder, connected with the solid rotating spindle above the upper end of the bolster and within the bobbin, and extended below the base of the bobbin to receive and hold the yarn directed from the bobbin to the receiver or holder, to hold the end of the yarn before doffing the bobbin, and to receive and cover the upper end of the bolster, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JACOB H. SAWYER.

Witnesses:

G. W. GREGORY,

W. J. PRATT.